**INDOOR AIR QUALITY ASSESSMENT**

**Department of Children and Families**

**143 Munson Street**

**Greenfield, MA**



Prepared by:

Massachusetts Department of Public Health

Bureau of Environmental Health

Indoor Air Quality Program

June 2017

# Executive Summary

 Increase fresh air supply, reduce the number of plants and change water damaged ceiling tiles is recommended.

# Background

|  |  |
| --- | --- |
| Building: | Department of Children and Families (DCF) |
| Address: | 143 Munson Street, Greenfield, MA |
| Assessment Requested by: | Cory Thomas, Field Operations, Executive Office of Health and Human Services (EOHHS) |
| Reason for Request: | General indoor air quality (IAQ). |
| Date of Assessment: | May 19, 2017 |
| Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment: | Mike Feeney, Director, IAQ Program |
| Building Description: | Square brick building with a flat roof.  |
| Building Population: | Approximately 100 employees. |
| Year of Construction: | 2000s. |
| Windows: | Not openable |

# Methods

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015).

# IAQ Testing Results

The following is a summary of indoor air testing results (Table 1).

* ***Carbon dioxide levels*** were above 800 parts per million (ppm) in a about half of the areas assessed, indicating inadequate fresh air in portions of the space.
* ***Temperature*** was within the recommended range of 70°F to 78°F in all areas assessed.
* ***Relative humidity*** was within the recommended range of 40% to 60% in all areas assessed.
* ***Carbon monoxide*** levels were non-detectable in all indoor areas assessed.
* ***Fine particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality Standard (NAAQS) level of 35 μg/m3 in all areas assessed.

## Ventilation

A heating, ventilating, and air conditioning (HVAC) system has several functions. First it provides heating and, if equipped, cooling. Second, it is a source of fresh air. Finally, an HVAC system will dilute and remove normally occurring indoor environmental pollutants by not only introducing fresh air, but by filtering the airstream and ejecting stale air to the outdoors via exhaust ventilation. Even if an HVAC system is operating as designed, point sources of respiratory irritation may exist and cause symptoms in sensitive individuals. The following analysis examines and identifies components of the HVAC system and likely sources of respiratory irritant/allergen exposure due to water damage, aerosolized dust, and/or chemicals found in the indoor environment.

The assessment results indicate that the ventilation system is providing adequate fresh air for half of the building. Note that many areas had low occupancy which can reduce the creation of carbon dioxide. To maximize air exchange, the BEH recommends that mechanical ventilation systems operate continuously during periods of occupancy. Without the system operating as designed, normally occurring pollutants cannot be diluted or removed, allowing them to build up and lead to IAQ/comfort complaints.

Fresh air is provided by air handling units (AHUs) located on the roof. Air from the AHUs is filtered, heated/cooled, and delivered to rooms via ducted supply vents. Air is returned/exhausted through vents located around lights. Direct exhaust ventilation was present in restrooms and some conference rooms.

It is recommended that HVAC systems be re-balanced every five years to ensure adequate air systems function (SMACNA, 1994). It was unknown when the last time these systems had been balanced.

## Microbial/Moisture Concerns

Stained ceiling tiles were observed in one location (Table 1). Water-damaged ceiling tiles can provide a source of mold and should be replaced after a water leak is discovered and repaired.

Plants were observed in offices (Table 1). Plants can be a source of pollen and mold, which can be respiratory irritants to some individuals. Plants should be properly maintained and equipped with drip pans to prevent water damage to porous materials. Plants should also be located away from air diffusers to prevent the aerosolization of dirt, pollen, and mold. Water coolers, fountains, and small refrigerators were found located in carpeted areas where they can moisten the carpet and lead to microbial growth.

## Other IAQ Evaluations

Exposure to low levels of total volatile organic compounds (TVOCs) may produce eye, nose, throat, and/or respiratory irritation in some sensitive individuals. To determine if VOCs were present, BEH/IAQ staff examined rooms for products containing VOCs. BEH/IAQ staff noted air fresheners, hand sanitizers, cleaners, and dry erase materials in use within the building. All of these products have the potential to be irritants to the eyes, nose, throat, and respiratory system of sensitive individuals.

The offices were mostly carpeted. Carpets should be cleaned annually (or semi-annually in soiled/high traffic areas) in accordance with Institute of Inspection, Cleaning and Restoration Certification (IICRC) recommendations, (IICRC, 2012).

In some offices, items such as paper, boxes and decorative items make it harder for custodial staff to clean. Fan blades on personal fans had settled dust and debris, which can be reaerosolized and cause irritation.

# Conclusions/Recommendations

Based on observations at the time of assessment, the following is recommended:

1. Increase fresh air supply.
2. Operate supply and exhaust ventilation continuously in all areas during occupied periods.
3. Have the HVAC system balanced every 5 years in accordance with SMACNA recommendations (SMACNA, 1994).
4. Consider having direct exhaust installed in kitchen and copy areas to remove odors and particulates generated in these areas.
5. Repair any water leaks and replace stained ceiling tiles.
6. Keep plants in good condition, avoid overwatering, and avoid placing them on porous items such as carpets or paper.
7. Place refrigerators and water dispensing equipment in areas without carpeting or use a waterproof mat underneath them.
8. Reduce use of cleaning products, sanitizers, and scented products.
9. Clean carpeting in accordance with IICRC recommendations (IICRC, 2012).
10. Reduce stored materials and store in an organized manner to allow for thorough cleaning.
11. Clean supply and exhaust vents and personal fans regularly to prevent aerosolization of debris.
12. Refer to resource manual and other related IAQ documents located on the MDPH’s website for further building-wide evaluations and advice on maintaining public buildings. These documents are available at: <http://mass.gov/dph/iaq>.

# References

IICRC. 2012. Institute of Inspection, Cleaning and Restoration Certification. Carpet Cleaning: FAQ. Retrieved from <http://www.iicrc.org/consumers/care/carpet-cleaning>.

MDPH. 2015. Massachusetts Department of Public Health. Indoor Air Quality Manual: Chapters I-III. Available at: <http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/>.

SMACNA. 1994. HVAC Systems Commissioning Manual. 1st ed. Sheet Metal and Air Conditioning Contractors’ National Association, Inc., Chantilly, VA

| **Location** | **Carbon****Dioxide****(ppm)** | **Carbon Monoxide****(ppm)** | **Temp****(°F)** | **Relative****Humidity****(%)** | **PM2.5****(µg/m3)** | **Occupants****in Room** | **Windows****Openable** | **Ventilation** | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Supply** | **Exhaust** |
| Background (Outdoors) | 373 |  | 86 | 40 | 12 |  |  |  |  |  |
| Meeting room | 897 | ND | 75 | 45 | 8 | 4 | N | Y | Y |  |
| Clerical unit | 915 | ND | 74 | 45 | 8 | 1 | N | Y | Y |  |
| Area Admin Mgr. | 828 | ND | 74 | 44 | 10 | 0 | N | Y | Y |  |
| Area Program Mgr. | 821 | ND | 74 | 44 | 9 | 0 | N | Y | Y | Plants |
| Unit A | 811 | ND | 74 | 45 | 11 | 0 | N | Y | Y | Plants |
| Unit C | 826 | ND | 75 | 45 | 10 | 2 | N | Y | Y |  |
| WCOU | 845 | ND | 75 | 45 | 10 | 2 | N | Y | Y | Plants |
| WCOU | 856 | ND | 75 | 44 | 11 | 2 | N | Y | Y | Plants |
| Unit A Supervisor | 859 | ND | 75 | 44 | 10 | 2 | N | Y | Y |  |
| Area Program Mgr. | 808 | ND | 75 | 44 | 9 | 0 | N | Y | Y |  |
| Unit C | 950 | ND | 74 | 46 | 11 | 1 | N | Y | Y | Plants |
| C Unit Mgr. | 860 | ND | 75 | 44 | 12 | 2 | N | Y | Y | Plants |
| Photocopier | 827 | ND | 74 | 44 | 8 | 0 | N | Y | Y | Photocopier |
| WCOU Supervisor | 861 | ND | 74 | 45 | 15 | 0 | N | Y | Y | Plant |
| FRU | 896 | ND | 74 | 44 | 9 | 3 | N | Y | Y |  |
| FRA Supervisor | 829 | ND | 74 | 45 | 12 | 1 | N | Y | Y |  |
| FRU Supervisor | 876 | ND | 74 | 44 | 8 | 2 | N | Y | Y |  |
| Office | 826 | ND | 74 | 44 | 7 | 0 | N | Y | Y |  |
| NQ Unit B Supervisor | 864 | ND | 74 | 44 | 8 | 1 | N | Y | Y |  |
| Children’s storage 02 | 643 | ND | 75 | 44 | 8 | 0 | N | Y | Y |  |
| Children’s storage 01 | 668 | ND | 75 | 45 | 12 | 0 | N | Y | Y |  |
| Closed files room | 624 | ND | 75 | 45 | 10 | 0 | N | Y | Y |  |
| Conference room 02 | 615 | ND | 74 | 46 | 9 | 0 | N | Y | Y |  |
| Conference room 01 | 610 | ND | 74 | 47 | 12 | 0 | N | Y | Y |  |
| Staff support | 623 | ND | 75 | 47 | 10 | 0 | N | Y | Y |  |
| Adoption Unit Supervisor | 729 | ND | 76 | 45 | 13 | 0 | N | Y | Y |  |
| Adoption | 734 | ND | 76 | 44 | 10 | 2 | N | Y | Y |  |
| Open files room | 721 | ND | 76 | 43 | 9 | 0 | N | Y | Y | 1 water-damaged ceiling tile |
| Area Mgr. | 782 | ND | 76 | 42 | 8 | 0 | N | Y | Y |  |
| Office | 813 | ND | 76 | 42 | 8 | 0 | N | Y | Y |  |
| Office | 866 | ND | 77 | 42 | 21 | 4 | N | Y | Y |  |
| NQUB Supervisor | 818 | ND | 76 | 40 | 10 | 1 | N | Y | Y |  |
| IUB | 800 | ND | 76 | 41 | 8 | 1 | N | Y | Y |  |
| IUB Supervisor | 786 | ND | 76 | 40 | 7 | 1 | N | Y | Y |  |
| IUA Supervisor | 783 | ND | 76 | 41 | 10 | 2 | N | Y | Y |  |
| IUA Supervisor | 789 | ND | 75 | 41 | 8 | 0 | N | Y | Y |  |
| Area Dir | 841 | ND | 75 | 41 | 7 | 2 | N | Y | Y |  |
| SU | 791 | ND | 75 | 41 | 8 | 1 | N | Y | Y |  |
| SU Supervisor | 778 | ND | 75 | 41 | 7 | 0 | N | Y | Y |  |
| Attorney 1 | 761 | ND | 74 | 41 | 7 | 0 | N | Y | Y |  |
| Conference room | 762 | ND | 74 | 41 | 7 | 0 | N | Y | Y |  |
| Reception | 782 | ND | 74 | 45 | 8 | 3 | N | Y | Y |  |
| Nursery | 724 | ND | 74 | 44 | 8 | 0 | N | Y | Y |  |
| CV Supervisor | 746 | ND | 74 | 42 | 7 | 0 | N | Y | Y |  |
| Clothes storage | 748 | ND | 74 | 42 | 8 | 0 | N | Y | Y |  |
| Paper storage | 749 | ND | 74 | 43 | 8 | 0 | N | Y | Y |  |
| Cubicles | 764 | ND | 74 | 43 | 7 | 4 | N | Y | Y |  |
| Office | 767 | ND | 74 | 43 | 7 | 0 | N | Y | Y |  |
| Cubicles | 790 | ND | 74 | 43 | 8 | 0 | N | Y | Y | Plants |
| Team room 1 | 768 | ND | 73 | 44 | 11 | 1 | N | Y | Y |  |
| Team room 2 | 760 | ND | 72 | 43 | 8 | 0 | N | Y | Y |  |
| CV Supervisor | 761 | ND | 72 | 44 | 8 | 0 | N | Y | Y |  |
| Adolescent | 657 | ND | 71 | 46 | 10 | 0 | N | Y | Y |  |
| Children | 657 | ND | 72 | 46 | 7 | 0 | N | Y | Y |  |
| Interview B | 683 | ND | 71 | 45 | 8 | 0 | N | Y | Y |  |
| Interview 3 | 665 | ND | 71 | 46 | 7 | 0 | N | Y | Y |  |
| Interview A | 664 | ND | 70 | 47 | 7 | 0 | N | Y | Y |  |
| Interview 4 | 656 | ND | 70 | 46 | 8 | 0 | N | Y | Y |  |